

ABSTRACT OF THE DISCLOSURE

Heater duty cycle (the active pressure control circuit) in recondensing superconducting magnet systems is monitored to determine total thermal system performance, to minimize non-zero boil-off operation, and to reduce maintenance costs. Undesirable conditions, such as a degrading cold head, plumbing leaks, and so forth, may be detected earlier by monitoring heater duty cycle. Appropriate service intervals may be determined and cryogen or helium losses may be reduced. The technique provides earliest possible identification of failures related to such variables, as well as, facilitates isolation of the root cause of the problem. Monitoring of heater duty cycle (energization time) offers advantages over the traditional approach of monitoring or alarming on low level in the cryogen (helium) vessel. The technique may provide for relying on observation of the effects of reduced cooling capacity, such as abnormal heater duty cycle, early enough in the failure cycle to prevent helium loss and equipment damage.